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Vegetation Survey and Forest Inventory, American Samoa

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INTRODUCTION

The unincorporated Territory of American Samoa is the only United States possession south of the equator. Knowledge of the extent and composition of its vegetation, including forest land, is needed for land-use planning. To fill this need, the USDA Forest Service, at the request of the Government of American Samoa, mapped the vegetation types of American Samoa and conducted a forest survey in cooperation with three American Samoan agencies: the Department of Agriculture, the American Samoa Community College Land Grant Program, and the Office of Economic Development and Planning. These maps are intended to provide guides for land-use planning and forest resource management.

The major employers in American Samoa are the local government and the two tuna canneries. Together they employ about 50 percent of American Samoa's labor force. Subsistence farming is the main agricultural enterprise. The main crops are bananas, breadfruit, coconuts, and taro. U.S. Department of Agriculture, Soil Conservation Service soil scientists have mapped and described 20 soil series, families, and variants on American Samoa as guides for farmers, land managers, developers, and others (Nakamura 1984).

This bulletin presents four vegetation maps (see maps in back pocket) and statistics on the timberland area and volume that were developed from the survey. Descriptions of the various vegetation types and their ecological functions and uses are included.

GEOGRAPHY AND CLIMATE

The Polynesian islands of American Samoa are part of the Samoan group, which includes the independent nation of Western Samoa. We surveyed the main island of Tutuila; the Manu'a Islands of Ofu, Olosega, and Ta'u; and two smaller islands, Aunu'u and Nu'utele. Taputapu, Nu'usetoga, and Pola, three satellite islands adjacent to Tutuila, were also mapped and their area included in the information on Tutuila.

American Samoa is located in the South Pacific Ocean, just east of the International Date Line (lat. 14°18' S. and long. 170°41' E.) *(fig. 1)*. These islands are about 1000 statute miles (1600 km) south of the equator and about 2604 statute miles (4190 km) south southwest of Honolulu.

The highest point in American Samoa is Mt. Lata on Ta'u Island, which rises to 3166 ft (965 m). The highest point on the main island of Tutuila is Mt. Matafao at 2142 ft (653 m) (American Samoa Government 1981). The topography is steep with about 50 percent of the land exceeding 70 percent slope *(fig. 2*; Nakamura 1984).

The climate is hot, wet and humid. Average annual rainfall measured at the Pago Pago International Airport weather station is 125 inches (3175 mm). Rainfall varies with elevation and aspect. In Pago Pago Harbor, estimated rainfall is 200 inches (5080 mm) per year, and on Ta'u Island, Mt. Lata's rainfall is estimated at 300 inches (7600 mm) or more annually. The average annual temperature is 26 °C (79 °F) at sea level and slightly lower at higher elevations. Average monthly temperatures vary from the annual average by no more than 1.7 °C (3 °F) and the average daily temperature range is only 8.40 °C (15 °F) throughout the year. Relative humidity ranges from 72 to 77 percent during the day and 87 to 93 percent at night (National Oceanic and Atmospheric Administration 1983).

Hurricanes are fairly common to American Samoa, with five since 1966. The most recent—Hurricane Tusi—struck the Manu'a Islands of Ta'u, Ofu, and Olosega on January 17, 1987, inflicting heavy damage to the towns and natural resources of the islands. Statistical information in this bulletin does not reflect the impact of Hurricane Tusi.

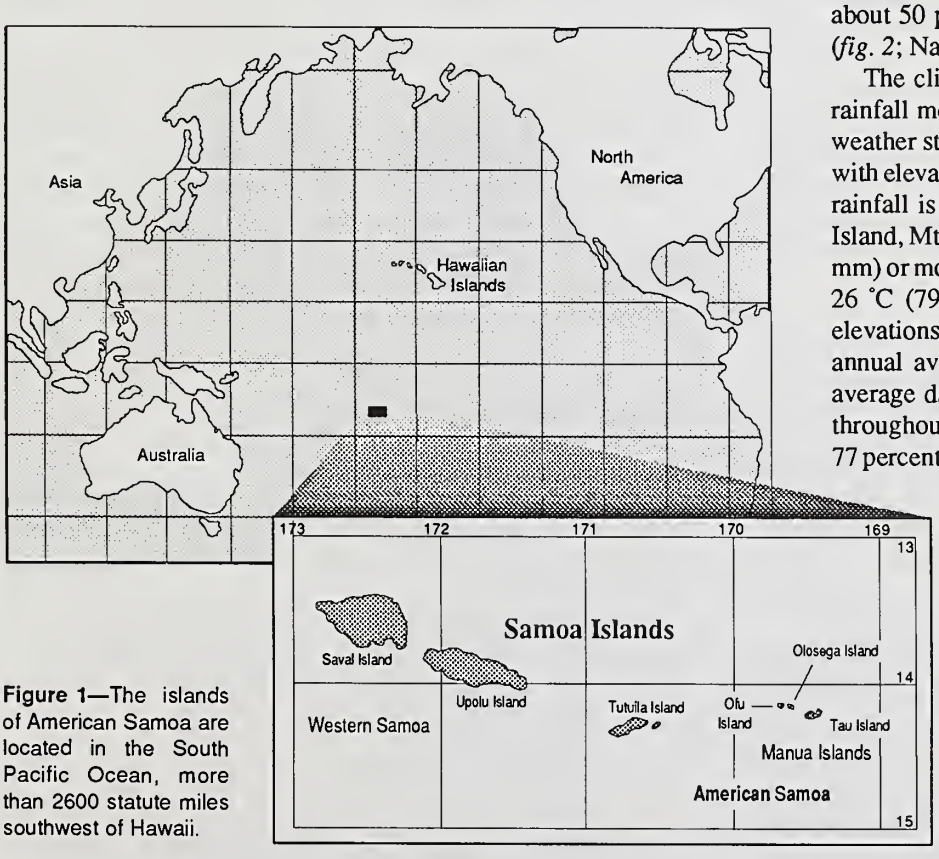

Figure 1—The islands of American Samoa are located in the South Pacific Ocean, more than 2600 statute miles southwest of Hawaii.

Figure 2—Pago Pago Harbor, American Samoa, is one of the best deep water ports in the South Pacific. Mt. Matafao in the background is the highest point on Tutuila and typifies the rugged interiors of the islands.

VEGETATION SURVEY

Survey Methods

American Samoa's vegetation types were identified and delineated on black and white photographs taken in 1984 at a nominal scale of 1:10,000. Before vegetation typing began, a vegetation mapping scheme was devised. Because much of the islands is inaccessible by road and funds were limited, vegetation types were restricted to those that could be recognized on the photos without intensive ground checking. Also, the type characteristics delineated were those most useful to foresters and land-use planners. After field reconnaissance, we adopted the classification scheme described herein.

Vegetation differences can often be recognized by examining photographs stereoscopically for differences in tone, texture, and image patterns. In some cases, individual plants may be recognized by their distinctive shape. Thus, after comparing photo imagery with ground conditions in the field, a skilled interpreter becomes fairly proficient at recognizing vegetative types on aerial photos. Overall accuracy depends on these factors: scale, age, and quality of the photographs; skill of the interpreter; degree to which the types differ in image characteristics; and the amount of ground training and checking by the interpreter.

Types were delineated on the photos after stereoscopic examination and ground checking in 1986, along roads and trails. The Engineering Geometronics Section of the Forest Service's Pacific Southwest Regional Office transferred the delineated types to base maps and measured the type areas.

Type Classifications

For mapping purposes, the islands of American Samoa were divided into four broad land classes—forest, secondary vegetation, agroforest, and nonforest (*table 1, figs. 3-5*). Minimum area typed is 1 acre (0.4 ha).

Forest—The forest class consists of five types of areas vegetated with live trees:

Upland forest (UP)
Coastal forest (CF)
Mangrove forest (MN)
Dwarf forest (DF)
Moss forest (MS)

These types have been further subdivided into size and density classes (*table 2*), identified by these codes:

Code	Size class
0	Short, shrub-like stands smaller than 5 inches (12.5 cm) in diameter at breast height (d.b.h.).
1	Trees averaging less than 12 inches (30 cm) in d.b.h. but larger than or equal to 5 inches (12.5 cm) in d.b.h.
2	Trees averaging 12 inches (30 cm) or more in d.b.h.

Code	Density class
H	High—crown closure of main canopy over 70 percent.
M	Medium—crown closure of main canopy from 30 to 70 percent.
L	Low—crown closure of main canopy less than 30 percent.

Secondary Vegetation— Secondary vegetation (SV) includes vines, shrubs, and small trees on recently disturbed areas.

Agroforest— The agroforest (AG) class primarily consists of areas under cultivation for both fruit and other food crops, and for trees and wood products.

Nonforest—Nonforest areas include grasslands, marshes, degraded sites, and areas developed for urban use. The seven types in this class are:

Grassland (G)
Strand (S)
Marsh (M)
Cropland (C)
Urban (U)
Barren (B)
Water (W)

On the maps, the vegetative areas are numbered and identified by symbols in the legend (*table 3*). In each symbol, the vegetation type is shown first, followed by the size class and density class. For example, CF1H indicates coastal forest trees that are less than 12 inches (30 cm) but at least 5 inches (12.5 cm) in diameter, with a crown closure greater than 70 percent. Where possible, predominant species are identified. In such cases, the density class is followed by a period, then by the first letter of the genus name, as in MS1H.C when *Cyathea* spp. (tree fern) makes up at least 20 percent of the moss forest stand. Occasionally, two-storied stands are identified by a slash between the overstory and understory classes, with size and density classes given only for the overstory type. For example, UP2M.R/SV.H would indicate an overstory composed of scattered, large *Rhus taitensis* trees overtopping secondary vegetation with a *Hibiscus tiliaceus* component.

Vegetation Type Descriptions

Before the arrival of the Polynesians more than 3,000 years ago, nearly all of American Samoa, from the seashore to the tops of the mountains, was covered with rain forests. But due to human activities—mostly shifting cultivation, and since the 1880's, the development of commercial coconut plantations—the forest was replaced by secondary vegetation. Today, the little virgin forest that remains is mostly on steep interior slopes and in the wet, cool montane regions away from villages.

Five types of native forest—upland (UP), coastal (CF), mangrove (MN), dwarf vegetation (DV), and moss (MS)—are distinguished here (*figs. 6-8*). The upland forest type includes several subtypes: upland forest with *Cyathea* spp. (UP.C), montane scrub (UP0), and the disturbed subtypes; upland forest with secondary vegetation (UP/SV); upland forest with *Rhus taitensis* (UP.R); and upland forest with coconuts (UP.CO) (*fig. 9*). All plant species mentioned in this bulletin are listed in *table 4*.

Upland Forest (UP)

The upland (or rainforest) is the climax vegetation for most of American Samoa. These forests were well developed, probably falling into our UP1 size class, with trees exceeding 12 inches (30 cm) or more in diameter. Few now are left that exceed 3 feet (1 m) in diameter. Stands that do reach this size have upper canopy layers that are over 80 feet (24 m) tall. The forest floor is often rich

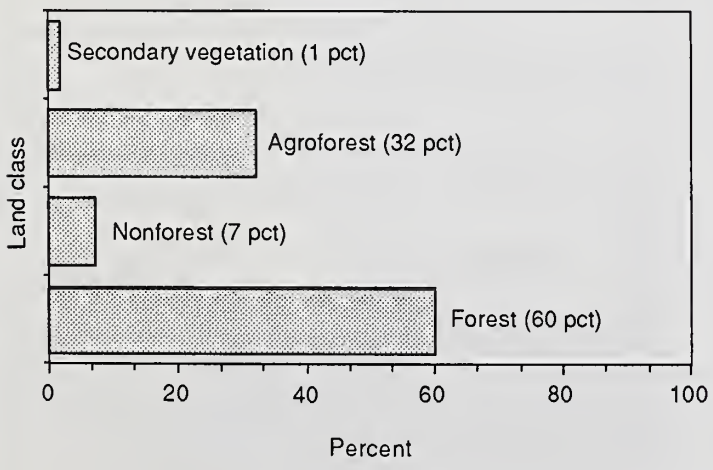

Figure 3—Percentages of major land classes found on the islands of American Samoa.

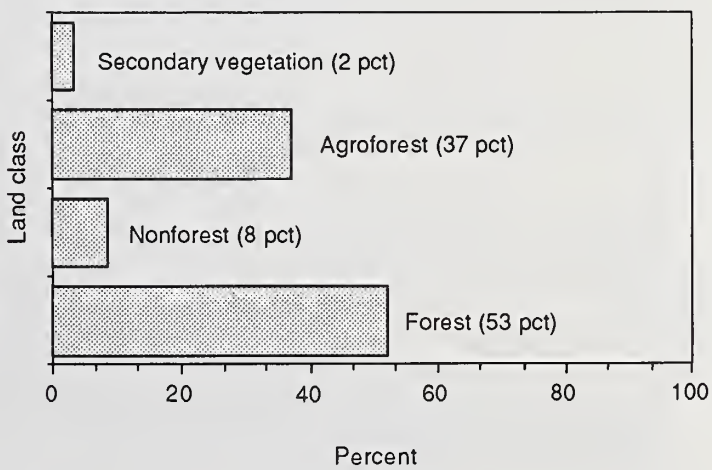

Figure 4—Percentages of major land classes on the main island of Tutuila.

Table 1—*Area of six islands of American Samoa, by land class and type, 1985*

Land class and type	Symbol	Island						Total	
		Tutuila	Ta'u	Ofu	Olo-sega	Au-nu'u	Nu'u-tele		
		Acres (hectares)							
Forest:									
Upland forest	UP	17,173	4,594	808	188	-	-	22,763	(9,212)
Coastal forest	CF	462	966	190	420	32	15	2,085	(844)
Mangrove forest	MN	121	-	-	-	8	-	129	(52)
Dwarf forest	DV	20	442	129	76	-	-	667	(270)
Moss forest	MS	-	2,948	-	94	-	-	3,042	(1,231)
Total forest		17,776	8,950	1,127	778	40	15	28,686	(11,609)
Secondary vegetation:	SV	576	25	-	-	7	-	608	(246)
Agroforest:									
Agroforest	AG	32	57	47	-	-	-	136	(55)
Agroforest with coconuts	AG.CO	12,264	425	12	76	173	-	12,950	(5,241)
Agroforest with bananas	AG/C.B	7	-	-	-	-	-	7	(3)
Coconut plantation	CO	15	1,431	487	413	49	22	2,417	(978)
Total agroforest		12,318	1,913	546	489	222	22	15,510	(6,277)
Nonforest:									
Marsh, fresh	M.F	5	17	3	7	40	-	72	(29)
Marsh, saline	M.S	-	-	-	-	12	-	12	(5)
Grasslands	G	267	84	44	5	3	-	403	(163)
Strand	S	69	104	12	22	13	-	220	(89)
Cropland	C	72	-	2	-	17	-	91	(37)
Urban	U	2,016	49	30	3	27	-	2,125	(860)
Urban/crops, urban/agro-forest	U/C, U/AG	143	67	-	-	-	-	210	(85)
Barren	B	10	-	-	-	-	-	10	(4)
Water, fresh	W.F	-	-	-	-	7	-	7	(3)
Water, saline	W.S	57	-	-	-	-	-	57	(23)
Total nonforest		2,639	321	91	37	119	-	3,207	(1,298)
Total area		33,309	11,209	1,764	1,304	388	37	48,011	(19,430)

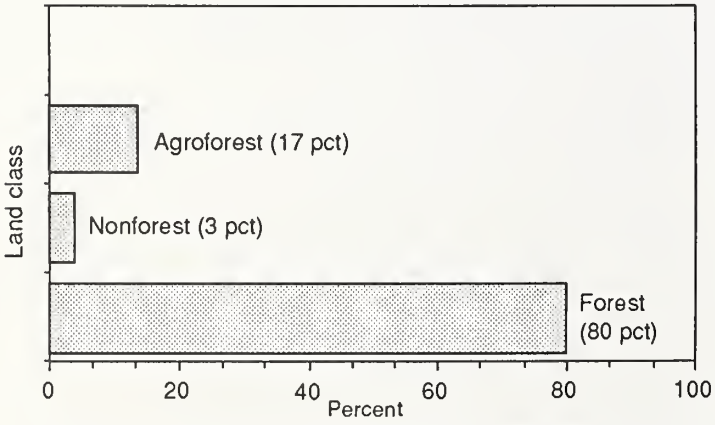

Figure 5—Percentages of major land classes on the island of Ta'u.

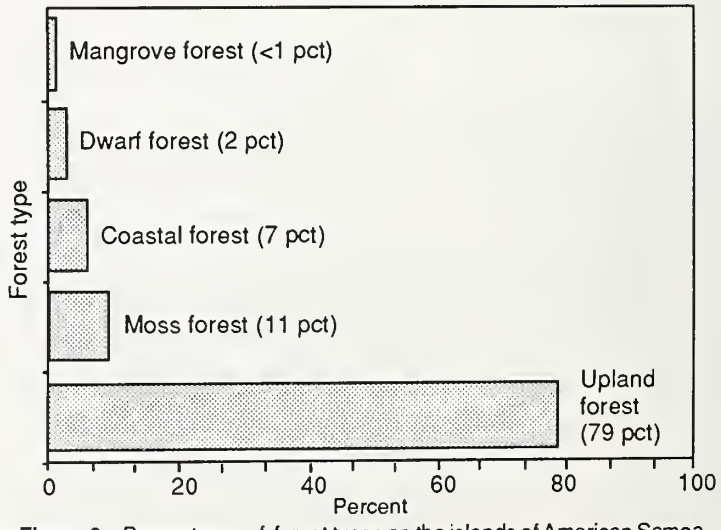

Figure 6—Percentages of forest types on the islands of American Samoa.

Table 2—*Area of forest land, by size and density classes, Tutuila and Ta'u islands, American Samoa, 1985*[1]

Island and type	Size class[2]	Density classes[3]			Total	
		Low	Medium	High		
		Acres (hectares)				
Tutuila:						
Upland forest	0	-	-	168	168	(68)
Upland forest	1	415	1,856	2,256	4,527	(1,832)
Upland forest	2	-	2,273	10,205	12,478	(5,050)
Coastal forest	0	-	-	12	12	(5)
Coastal forest	1	20	96	158	274	(111)
Coastal forest	2	-	74	101	175	(71)
Mangrove forest	0	-	-	52	52	(21)
Mangrove forest	1	-	-	40	40	(16)
Mangrove forest	2	-	-	30	30	(12)
Dwarf forest	0	-	-	20	20	(8)
Total		435	4,299	13,042	17,776	(7,194)
Ta'u:						
Upland forest	1	-	547	2,063	2,610	(1,056)
Upland forest	2	-	-	1,984	1,984	(803)
Coastal forest	1	-	96	527	623	(252)
Coastal forest	2	-	-	343	343	(139)
Dwarf forest	0	-	-	442	442	(179)
Moss forest	1	-	-	2,948	2,948	(1,193)
Total		-	643	8,307	8,950	(3,622)
Total forest		435	4,942	21,349	26,726	(10,816)

[1]Adjusted by the proportion of field plots mapped as forest but were found to be agroforest.

[2]0—Short, shrub-like trees smaller than 5 in. (12.5 cm) in d.b.h.
1—Trees averaging less than 12 in. (30 cm) in d.b.h., but larger than 5 in. (12.5 cm) in d.b.h.
2—Trees averaging 12 in. (30 cm) or more in d.b.h.

[3]Crown closure of main canopy: Low <30 pct; medium 30-70 pct; high >70 pct.

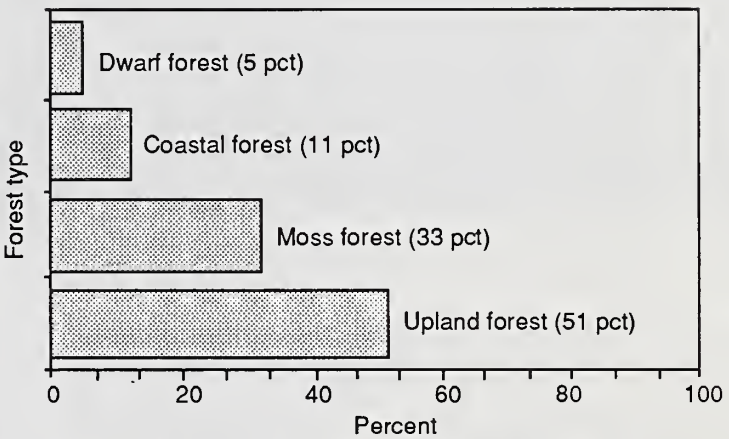

Figure 8—Percentages of forest types for the island of Ta'u.

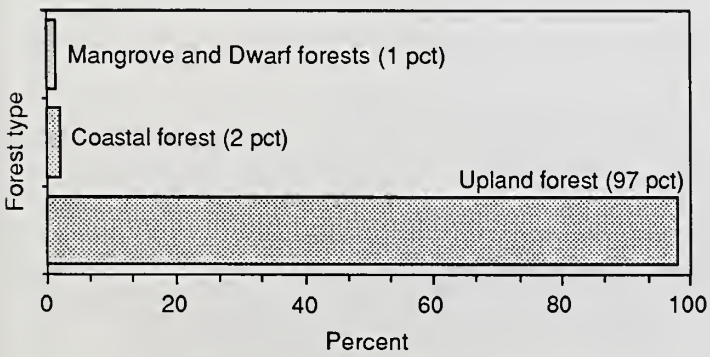

Figure 7—Percentages of forest types for the island of Tutuila.

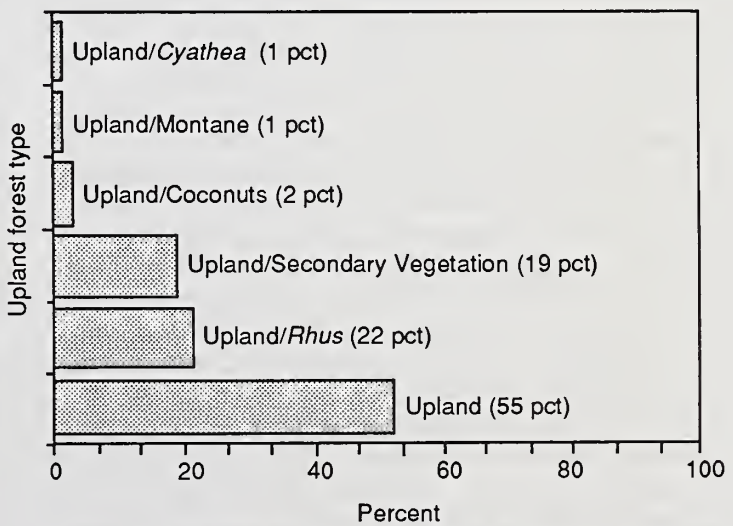

Figure 9—Percentages of upland forest types and subtypes on American Samoa.

Figure 10—Rainmaker Mountain (North Pioa Mt.) is vegetated by montane scrub. These old trachyte plugs are inhospitable sites for plants, but certain adapted species thrive.

layers that are over 80 feet (24 m) tall. The forest floor is often rich in ferns such as *Lomagramma cordipinna*. Vines such as *Piper graeffei*, *Freycinetia* spp., *Raphidophora graeffei*, and *Epipremnum pinnatum* abound in the lower canopy, while epiphytic orchids and ferns cover many of the branches in the upper canopy.

Many species are found in the upland forests—particularly in wetter areas at higher elevations. On the basis of dominant tree species and species composition, several vegetation subtypes can be distinguished in the otherwise similar forest structure. Differences in dominant species result from differences in elevation, rainfall, soil, insolation, topography, and utilization.

In areas where the ground is covered with rough, geologically recent lava flows, such as the Tafuna Plain, the dominants of the natural vegetation (only a small remnant of which is still standing) are *Pometia pinnata*, *Planchonella torricellensis*, *Dysoxylum samoense*, *D. maota*, *Syzygium inophylloides*, *Kleinhovia hospita*, *Litsea samoensis*, *Neonauclea forsteri*, *Myristica fatua*, and *Ficus prolixa*. On lowland ridges where the soil is drier, the dominant species are *Syzygium inophylloides*, *Planchonella linggensis*, *Fagraea berteriana*, *Canarium samoense*, *Intsia bijuga*, *Rhus taitensis*, and *Alphitonia zizyphoides*. In the montane areas, the dominant species include *Dysoxylum huntii*, *Aglaia samoensis*, *Arytera* spp., *Flacourtia rukam*, *Inocarpus fagifer*, *Terminalia richii*, *Canarium samoense*, *Myristica fatua*, *M. hypargyraea*, *Buchanania merrillii*, and *Syzygium samoense*. Understory species include *Diospyros samoensis*, *Alstonia* spp., and *Psychotria* spp.

Upland Forest/Cyathea spp. (UP.C)

This upland forest subtype is found only on Ta'u and consists of a low to medium height upland forest with a large percentage of *Cyathea* spp. (tree ferns) in the overstory. *Cyathea* spp. is listed separately in *tables 3* and *6*. Upland forest/*Cyathea* spp. subtype appears to be a transition zone between lower elevation upland forest and the higher elevation moss forest types. The dominant forest species are similar to the upland forest and the moss forest types.

Montane Scrub (UP0)

This scrub form of the upland forest type is found only in the mountains of Tutuila and is restricted to the summits of old trachyte plugs, most notably Matafao, Rainmaker, and Tau Mountains (*fig. 10*). Fertility is low on the hard clay soil of these plugs and the rooting depth is shallow. Many of the species growing on trachyte plugs are found only in these inhospitable sites.

The type is dominated by scrubby understory species with scattered trees of low stature. The most common understory species are *Dicranopteris linearis*, *Lycopodium cernuum*, *Dipteris conjugata*, *Cyathea truncata*, *Nephrolepis biserrata*, *Davallia epiphylla*, *Freycinetia* spp., *Scleria polycarpa*, and *Machaerina falcata*. The dominant trees are *Pandanus reineckei*, *Rapanea myricifolia*, *Syzygium brevifolium*, *Astronidium navigatorum*, *Metrosideros collina*, and *Spiraeanthemum samoense*.

Table 3—*Vegetation type and subtype codes, by land class, American Samoa, 1985*

Vegetation codes	Vegetation types, subtypes, and components[1,2]	Vegetation codes	Vegetation types, subtypes, and components[1,2]
	Forest		
UP	Upland forest, various size and density classes apply	CF.CO	Coconut component
		CF/SV	Secondary vegetation understory
UP.C	*Cyathea* spp. component	CF/SV.H	*Hibiscus* understory
UP.R	*Rhus* component	CF/SV.V	Vine understory
UP.CO	Coconut component		
UP.R.CO	*Rhus* and coconut components		
UP/S	Strand understory	MN	Mangrove forest, various size and density classes apply
UP/SV	Secondary vegetation understory		
UP/SV.G	Grass understory	MN.B	*Bruguiera* component
UP/SV.H	*Hibiscus* understory		
UP/SV.S	Shrub understory	DV	Dwarf forest, various density classes apply, but only size class 0 applicable
UP/SV.V	Vine understory		
UP.R/SV.H	*Rhus* and *Hibiscus* component		
CF	Coastal forest, various size and density classes apply	MS.C	Moss forest, *Cyathea* spp. component, various size and density classes apply
	Secondary vegetation		
SV	Secondary vegetation, size and density classes do not apply	SV.L	*Leucaena*
		SV.S	Shrub component
SV.G	Grass component	SV.V	Vine component
SV.G.S	Grass and shrub components	SV.V.H	Vine and *Hibiscus* components
SV.H	*Hibiscus* component		
	Agroforest		
AG	Agroforest	AG.CO/U	Urban inclusions
AG/C.B	Banana understory		
AG/SV	Secondary vegetation understory	CO	Coconut plantation, various size and density classes apply
AG.CO	Coconut component		
AG.CO.UP	Upland forest component	CO.CF	Coastal forest component
AG.CO.UP.R	*Rhus* component	CO.UP	Upland forest component
AG.CO/C.B	Banana understory	CO.UP.C	*Cyathea* spp. component
AG.CO/SV	Secondary vegetation understory	CO.UP.R	*Rhus* component
AG.CO/SV.G	Grass understory	CO/SV	Secondary vegetation understory
AG.CO/SV.H	*Hibiscus* understory	CO/SV.G	Grass understory
AG.CO/SV.S	Shrub understory	CO/SV.G.S	Grass and shrub understory
AG.CO/SV.V	Vine understory		
	Nonforest		
G	Grassland	M.F.S	*Cyclosorus* marsh
G.F	Fern component		
G.G	Grass component	C	Cropland
G.G.C	Grass with cultivated inclusions	C.B	Banana cultivation
G.G.S	Grass and shrub components		
G.S	Shrub component	U	Urban land
		U/AG	Agroforest inclusions
S	Strand	U/AG.CO	Coconut inclusions
S.P	*Pandanus* component	U/C	Cropland inclusions
S.S	Shrub component		
		B.D	Barren, disturbed
M.F	Freshwater marsh		
M.F.A	*Acrostichum* marsh	W.F	Water, fresh
M.F.C	Cultivated marsh (taro)	W.S	Water, saline

[1]Size classes and density codes are used only with the forest class and with the coconut plantation type.

[2]All components, inclusions, or understory species must be present on at least 20 percent of the mapped area.

Table 4—*List of species mentioned in text and tables*

Genus	Species	Author	Family
Acrostichum	*aureum*	L.	Adiantaceae
Aglaia	*samoensis*	A. Gray	Meliaceae
Alstonia	spp.		Melastomataceae
Alphitonia	*zizyphoides*	(Spreng.) A. Gray	Rhamnaceae
Artocarpus	*altilis*	(Park) Fosb.	Moraceae
Arytera	spp.		Sapindaceae
Ascarina	*diffusa*	A.C. Smith	Chloranthaceae
Astronidium	*navigatorum*	Chr.	Melastomataceae
Astronidium	*pickeringii*	(A. Gray) Chr.	Melastomataceae
Barringtonia	*asiatica*	(L.) Kurz	Lecythidaceae
Barringtonia	*samoensis*	A. Gray	Lecythidaceae
Bischofia	*javanica*	Bl.	Euphorbiaceae
Bruguiera	*gymnorhiza*	(L.) Lmk.	Rhizophoraceae
Buchanania	*merrillii*	Chr.	Anacardiaceae
Calophyllum	*inophyllum*	L.	Guttiferae
Calophyllum	*samoense*	Chr.	Guttiferae
Cananga	*odorata*	(Lam.) Hook. & Thoms.	Annonaceae
Canarium	*samoense*	Eng.	Burseraceae
Canavalia	*maritima*	(Aubl.) Thou.	Papilionatae
Canavalia	*rosea*	(Sw.) DC.	Papilionatae
Cerbera	*manghas*	L.	Apocynaceae
Cocos	*nucifera*	L.	Palmae
Colubrina	*asiatica*	(L.) Brongn.	Rhamnaceae
Cordia	*subcordata*	Lam.	Boraginaceae
Cyathea	spp.		Cyatheaceae
Cyathea	*truncata*	(Brack.) Copel.	Cyatheaceae
Cyclosorus	*interruptus*	(Willd.) H. Ito	Thelypteridaceae
Davallia	*epiphylla*	(Forst. f.) Spreng.	Davalliaceae
Dicranopteris	*linearis*	(Burm.) Underw.	Gleicheniaceae
Dipteris	*conjugata*	Reinw.	Polypodiaceae
Diospyros	*elliptica*	(Forst.) P.S. Green	Ebenaceae
Diospyros	*samoensis*	A. Gray	Ebenaceae
Dysoxylum	*huntii*	Merr.	Meliaceae
Dysoxylum	*maota*	Rein.	Meliaceae
Dysoxylum	*samoense*	A. Gray	Meliaceae
Dysoxylum	spp.		Meliaceae
Eleocharis	*dulcis*	(Burm. f.) Hens.	Cyperaceae
Epipremnum	*pinnatum*	(L.) Eng.	Araceae
Erythrina	*variegata*	(L.)	Leguminosae
Eugenia	spp.		Myrtaceae
Fagraea	*berteriana*	A. Gray	Loganiaceae
Ficus	*obliqua*	Forst. f.	Moraceae
Ficus	*prolixa*	Forst. f.	Moraceae
Ficus	*scabra*	Forst. f.	Moraceae
Fimbristylis	*cymosa*	R. Br.	Cyperaceae
Flacourtia	*rukam*	Zoll. et Mor.	Flacourtiaceae
Freycinetia	spp.		Pandanaceae
Garcinia	*myrtifolia*	A.C. Smith	Guttiferae
Gironniera	*celtidifolia*	Gaud.	Olmaceae
Glochidion	*ramiflorum*	Forst.	Euphorbiaceae
Hernandia	*nymphaeifolia*	(Presl) Kub.	Hemandiaceae
Hibiscus	*tiliaceus*	L.	Malvaceae
Inocarpus	*fagifer*	(Park.) Fosb.	Leguminosae
Intsia	*bijuga*	(Colebr.) O. Ktze.	Leguminosae
Ipomoea	*pes-caprae*	(L.) Roth	Convolvulaceae
Kleinhovia	*hospita*	L.	Sterculiaceae

Table 4—*List of species mentioned in text and tables (continued)*

Genus	Species	Author	Family
Lepturus	*repens*	(Forst. f.) R. Br.	Gramineae
Leucaena	*leucocephala*	(Lmk.) de Wit	Leguminosae
Litsea	*samoensis*	(Christ.) A.C. Sm.	Lauraceae
Lomagramma	*cordipinna*	Holttum	Lomariopsidaceae
Lycopodium	*cernuum*	L.	Lycopodiaceae
Macaranga	*harveyana*	Muell.-Arg.	Euphorbiaceae
Macaranga	*stipulosa*	Muell.-Arg.	Euphorbiaceae
Machaerina	*falcata*	(Nees) T. Koyama	Cyperaceae
Mangifera	*indica*	L.	Anacardiaceae
Melastoma	*denticulatum*	Labill.	Melastomataceae
Melochia	*aristata*	A. Gray	Sterculiaceae
Metrosideros	*collina*	(Forst.) A. Gray	Myrtaceae
Mikania	*micrantha*	H.B.K.	Compositae
Morinda	*citrifolia*	L.	Rubiaceae
Musa	spp.		Musaceae
Myristica	*fatua*	Houtt.	Myristicaceae
Myristica	*hypargyraea*	A. Gray	Myristicaceae
Neonauclea	*forsteri*	(Seem.) Merr.	Rubiaceae
Nephrolepis	*biserrata*	(Sw.) Schott	Davalliaceae
Pandanus	*reineckei*	Warb.	Pandanaceae
Pandanus	*tectorius*	Park.	Pandanaceae
Paspalum	*conjugatum*	Berg.	Gramineae
Paspalum	*distichum*	L.	Gramineae
Paspalum	*paniculatum*	L.	Gramineae
Planchonella	*grayana*	St. John	Sapotaceae
Planchonella	*linggensis*	(Burck.) Pierre	Sapotaceae
Planchonella	*torricellensis*	(Schum.) H.J. Lam	Sapotaceae
Piper	*graeffei*	C. DC.	Piperaceae
Pipturus	*argenteus*	(Forst. f.) Wedd.	Urticaceae
Pisonia	*grandis*	R. Br.	Nyctaginaceae
Pometia	*pinnata*	Forst.	Sapindaceae
Psidium	*guajava*	L.	Myrtaceae
Psychotria	spp.		Rubiaceae
Rapanea	*myricifolia*	(A. Gray) Mez.	Myrsinaceae
Raphidophora	*graeffei*	Eng.	Araceae
Reynoldsia	*lanutoensis*	Hoch.	Araliaceae
Rhizophora	*mangle*	L.	Rhizophoraceae
Rhus	*taitensis*	Guill.	Anacardiaceae
Scaevola	*taccada*	(Gaertn.) Roxb.	Goodeniaceae
Scleria	*polycarpa*	Boeck.	Cyperaceae
Spiraeanthemum	*samoense*	A. Gray	Cunoniaceae
Streblus	*anthropophagorum*	(Seem.) Corner	Moraceae
Syzygium	*brevifolium*	(A. Gray) C. Muell.	Myrtaceae
Syzygium	*clusiaefolium*	(A. Gray) C. Muell.	Myrtaceae
Syzygium	*dealatum*	(Burk.) A.C. Smith	Myrtaceae
Syzygium	*inophylloides*	(A. Gray) C. Muell.	Myrtaceae
Syzygium	*samarangense*	(Bl.) Merr. & Perry	Myrtaceae
Syzygium	*samoense*	(Burk.) Whistler	Myrtaceae
Terminalia	*richii*	A. Gray	Combretaceae
Thespesia	*populnea*	(L.) Sol.	Malvaceae
Trichospermum	*richii*	(A. Gray) Seem.	Tiliaceae
Vigna	*marina*	(Burm.) Merr.	Leguminosae
Wedelia	*biflora*	(L.) DC.	Compositae
Weinmannia	*affinis*	A. Gray	Cunoniaceae
Xylocarpus	*moluccensis*	(Lmk.) Roem.	Meliaceae

Sources: Christophersen (1935) and Amerson and others (1982).

Upland Forest/Secondary Vegetation (UP/SV)

This forest subtype, also called secondary forest (Amerson and others 1982), is a transitional stage between cleared or plantation land and climax forest. Many variations between the two are apparent. What distinguishes the upland forest/secondary vegetation subtype is the dominance of species in the canopy and understory layers that thrive on disturbance. These tree species usually have small, readily dispersed seeds, and fast growth rates that allow them to shade out and inhibit the slower growing upland forest species.

In its mature stages this forest subtype is most often characterized by two species: *Rhus taitensis* and *Alphitonia zizyphoides*. Large areas on the foothills are dominated by *Rhus* forest (UP.R). The even, homogeneous canopies of the *Rhus* trees are easily recognized on aerial photographs. In the younger stages of secondary forest, the dominant species include *Hibiscus tiliaceus, Macaranga harveyana, M. stipulosa, Bischofia javanica, Dysoxylum* spp., *Cananga odorata, Trichospermum richii, Glochidion ramiflorum,* and *Neonauclea forsteri*. In some areas, coconut palms are found in the overstory, indicating that the secondary forest is replacing a former coconut plantation (UP.CO).

Coastal Forest (CF)

This forest type characteristically occurs on a narrow strip between the strand or littoral vegetation (Amerson and others 1982) and the upland forest type. They are particularly prevalent on volcanic tuff cones and steep coastal slopes. The species found are not as salt-tolerant as those that dominate along the shoreline. On the moist inland slopes, coastal forest species are replaced by rain forest species. In their narrow zone—particularly on volcanic tuff cones and on steep coastal slopes—however, coastal forest species predominate.

Coastal forest trees are generally shorter than those of the upland forest. They are often closely spaced and have small to moderate trunk diameters. The forest floor is usually relatively open and epiphytes are sparse, but several species of lianas occur here. The dominant tree species in the coastal forest are *Diospyros samoensis, D. elliptica, Syzygium dealatum, Cerbera manghas, Cordia subcordata, Syzygium clusiaefolium, Planchonella grayana,* and *Ficus obliqua*. In contrast to strand species, coastal forest species usually have wind- or bird-dispersed seeds rather than seeds that are distributed by sea.

Littoral forest, located between the strand and coastal forest, is mapped as coastal forest in our survey. Although littoral forest is a distinct vegetation type (Amerson and others 1982), the boundary between the coastal and littoral forest types is very difficult to determine on aerial photographs. Therefore, it was grouped with the adjacent coastal forest vegetation and not the shrubby strand vegetation or littoral vegetation.

Littoral forest has predominately salt-tolerant trees with seeds that are dispersed by seawater or sea birds. The most common of these species are *Barringtonia asiatica, Calophyllum inophyllum, Pisonia grandis, Erythrina variegata, Thespesia populnea, Hibiscus tiliaceus, Cocos nucifera, Hernandia nymphaeifolia,* and *Pandanus tectorius*.

Mangrove (MN)

Undisturbed mangrove forest is comprised almost entirely of a single species, *Bruguiera gymnorhiza*, the oriental mangrove. These trees have large diameters and form a closed canopy 40 to 50 ft (12 to 15 m) high. The forest floor is open and the only plants able to survive among the breathing roots (pneumatophores) protruding from the black, mucky, saline soil, are seedlings of *Bruguiera*. Mangrove forest occupies wet places at the mouths of streams and along the edges of lagoons. If these wet coastal areas do not have a direct access to the sea (and, therefore, are not directly affected by seawater), a coastal marsh (M) will develop.

In disturbed mangrove stands or along their sunny margins, another mangrove species, *Rhizophora mangle*, predominates. Species such as *Xylocarpus moluccensis* and trees typical of the littoral forest are also found along the margins of the mangrove forest. Clumps of the marsh fern, *Acrostichum aureum*, sometimes occur in disturbed areas and on the margins of the forest.

Only few areas of mangrove forest remain. The most extensive stands occur at Pala Lagoon and Masefau on Tutuila and on Aunu'u Island. Mangrove is not found in the Manu'a Islands.

Dwarf Forest (DV)

This low-stature forest is located on the steep, windswept cliffs on the south slope of Mt. Lata on Ta'u, and below Mt. Piumafua on Olosega. Dwarf forests are usually comprised of the same species as moss forests (MS), but are stunted because of the harsh sites they occupy.

Moss Forest (MS)

Moss forest, commonly called "cloud forest," occurs only on the summits of Ta'u and Olosega. The dominant trees are *Syzygium samoense, Weinmannia affinis, Astronidium pickeringii, Dysoxylum huntii, Fagraea berteriana, Syzygium samarangense, Ascarina diffusa, Reynoldsia lanutoensis, Garcinia myrtifolia,* and *Streblus anthropophagorum*. This low open-canopy forest occurs in areas of high rainfall. This condition accounts for the ground and trees being densely covered by mosses, ferns, orchids, and other epiphytes, and by climbers such as *Freycinetia* spp. A major overstory component of Samoan moss forest is tree fern, *Cyathea* spp. (MS.C).

Secondary Vegetation

Secondary vegetation (SV) is dominated by shrubs and small trees, and is a successional stage between grasslands (G), agroforests (AG), or croplands (C) and secondary forest (UP/SV). The dominant species include *Melastoma denticulatum, Macaranga harveyana, Pipturus argenteus, Morinda citrifolia, Psidium guajava, Hibiscus tiliaceus, Melochia aristata,* and *Leucaena leucocephala*. Numerous herbaceous weeds and some weedy vines are also found in this type of vegetation.

Several successional stages can be seen on geologically recent lava flows near the Tafuna Airport on Tutuila. There, *Leucaena leucocephala* has been replaced by *Macaranga harveyana*, which in turn is being overgrown and shaded out by such rain forest species as *Dysoxylum samoense*.

Agroforest

Agroforests (AG)

Such forests are generally located along the coast, in valleys, and near villages. They are a mix of forest and food-producing trees and other cultured plants. Various food plants include coconuts (*Cocos nucifera*), breadfruit (*Artocarpus altilis*), various taro varieties, bananas (*Musa* spp.), mango (*Mangifera indica*), and a few other fruit trees of minor importance. Most agroforests in Samoa, especially on Tutuila, include a coconut component and are coded AG.CO. Managed agroforests, as found in Micronesia, however, are fairly rare in Samoa.

Coconut Plantation (CO)

Dense groves of coconut trees, originally planted for commercial reasons, are designated as CO. A distinctive characteristic on the aerial photographs of coconut plantation type is the geometric planting pattern of the groves. Remnant coconut plantations are fairly common in the lowlands, especially on Ta'u. Although the production of copra has virtually ceased in American Samoa, these groves are still used for food, fiber, and other purposes.

Nonforest

Grassland (G)

This type of vegetation occurs only in small patches and often occupies recently abandoned croplands (mostly taro). Grasslands represent the first successional stage of reclamation of disturbed lands. Among the dominant species in these grasslands are *Paspalum conjugatum*, *P. paniculatum*, and *Mikania micrantha*, and numerous other species.

Strand (S)

Strand vegetation (Amerson and others 1982) occupies undisturbed coasts on all of the islands of American Samoa. On the basis of physiognomy and species composition, several different types occur. If the shore is sandy, the area is usually dominated by creeping vines and is termed "sand strand." These vine species dominate: *Canavalia rosea, Vigna marina*, and *Ipomoea pescaprae*, and—to a lesser extent—the grass or sedge species *Lepturus repens, Paspalum distichum*, and *Fimbristylis cymosa*.

If the shore is rocky, grasses and succulents dominate. Species common to this rock strand include *Lepturus repens* and *Fimbristylis cymosa*.

Commonly associated with the herbaceous rock and sand strands is a zone of shrubby vegetation which usually separates the littoral forest from the shoreline strand. Species found in this area include *Scaevola taccada, Wedelia biflora*, and *Ficus scabra*. Occasionally (on southwest slopes of Olosega Island) this zone of shrubs develops into a major vegetative community. In addition, dense stands of *Pandanus tectorius* form small pockets along many coastlines.

Marsh (M)

Freshwater marshes usually occur along the coast in areas where stream outlets to the sea are blocked by sand barriers. These barriers cause the streams to spread out into low lying areas, saturating the soil. Despite the proximity of these marshes to the sea, mangrove trees are not present, possibly because the seeds cannot disperse across the sand barrier.

The dominant species in marshes are *Cyclosorus interruptus, Acrostichum aureum*, and *Eleocharis dulcis*. The most extensive area of marsh in American Samoa is found in Aunu'u Crater.

Cropland (C)

Cropland is cultivated land without tree cover. The most common crop is taro, primarily dryland taro that grows on the hills and valleys of the lowlands and sometimes in patches in the inland forests. Other crops include yams, cassava, and bananas (C.B).

Urban (U)

Urban land includes villages, buildings, roads, airports, and other development projects. Vegetation is usually sparse with lawns and hedges being the major types in villages. When trees are present, this type may intergrade into agroforest (U/AG) and coconut (U/AG.CO).

Barren (B)

Areas that lack natural vegetation because of rocks, sterile soil, bulldozing, and others are delineated as barren.

Water (W)

Includes fresh (W.F.) and saline (W.S) water.

FOREST INVENTORY

Inventory Procedures

Field data for the current inventory of forest resources were collected in 1986. The inventory was limited to forest lands on the islands of Aunu'u, Nu'utele, Olosega, Ofu, Ta'u, and Tutuila. Nonforest lands, secondary vegetation, agroforest, and areas incapable of growing trees over 5 inches (12.5 cm) in diameter at breast height (d.b.h.) (see *Glossary*) were excluded from the inventory *(table 5)*. The location and area of forest lands—timberland and other forest—were determined from the vegetation type maps for American Samoa (see maps in the back pocket). The type maps were based on aerial photographs taken in 1984. This inventory provides volume estimates only for timberland area.

Sampling was used in the inventory for three purposes:

1. To adjust typed timberland area for land class changes since the 1984 photography.
2. To estimate the proportion of timberland area too steep to permit growing and harvesting continuous crops of industrial roundwood.
3. To estimate timberland area and volume in a way that allows calculation of sampling errors for these statistics.

Table 5—*Area by land class and island, American Samoa, 1985*

Land class	Island				Total	
	Tutuila[1]	Ta'u	Ofu[2]	Olosega		
	Acres (hectares)					
Timberland	12,424	3,840	361	—	16,625	(6,728)
Other forests:						
Steep[3,4]	4,364	1,720	652	608	7,344	(2,972)
Scrub[4,5]	1,028	442	129	76	1,675	(678)
Moss[4]	—	2,948	—	94	3,042	(1,231)
Total timberland	17,816	8,950	1,142	778	28,686	(11,609)
Agroforest	12,540	1,913	568	489	15,510	(6,277)
Secondary vegetation	583	25	-	-	608	(246)
Nonforest	2,758	321	91	37	3,207	(1,298)
Total area	33,697	11,209	1,801	1,304	48,011	(19,430)

[1]Includes Aunu'u.
[2]Includes Nu'utele.
[3]Timberland generally with slopes in excess of 100 percent (>45°).
[4]Land incapable of producing continuous crops of trees for commercial use.
[5]Includes dwarf forest.

A square grid (0.9 mile [1.5 km]) was superimposed on the type maps. At each grid intersection falling in a timberland type, a plot was field-checked for steepness and classification accuracy; 26 plots were examined on Tutuila, 6 on Ta'u, and 2 on Ofu. Examination revealed that some land typed as timberland was actually agroforest. These classification differences occurred for two reasons: (1) the conversion of forest land, and (2) typing inaccuracies due to the presence of clouds on the aerial photography. Additionally, five plots on Tutuila and two each on Ta'u and Ofu had slopes exceeding 100 percent and were reclassified "other forests—steep."

Because few grid intersections occurred on Ofu, Olosega, and Ta'u, the sample was augmented by selecting supplementary plots within mapped timberland types. These additional plots were examined only for steepness in order to improve the area estimate for timberland and other forests—steep. The use of supplemental points was possible because field reconnaissance on the three islands indicated that no timberland grid plots had been converted to other land uses since the photographs were taken. On Tutuila, the conversion of two timberland grid plots to agroforest prevented the use of supplemental plots to evaluate steepness and timberland.

After adjustments for steepness, land-use conversion and type errors due to cloud cover, 20 plots on the grid remained classified as timberland: 16 on Tutuila and 4 on Ta'u. Field crews carefully located each of these plots at its pinpricked location on the aerial photographs. Cloud patterns on the photographs obscured several plots; the crews located these using topographical maps. Each plot was referenced on the ground for future remeasurements.

A cluster of five systematically chosen sample points was established at each location with the points distributed across about 6 acres (2.5 ha). At each point, all trees with d.b.h. between 5 inches (12.5 cm) and 35 inches (90 cm) were tallied, if selected, using a variable plot sampling calibrated to a basal area factor of 30.5 ft^2 per acre (7 m^2/ha) (Grosenbaugh 1958). Additionally, all trees over 35 inches (90 cm) d.b.h. within 55.8 ft (17 m) of point center were tallied, as were trees less than 5 inches (12.5 cm) within 7.7 ft (2.36 m) of point center.

Species, diameter at breast height, and total height were recorded for each tally tree. Each tree was visually divided into segments, and the length and end diameters of the segments were measured or estimated. Each segment was classified as either a sawlog, poletimber, roughwood, upper stem, craftwood bolt, crotch, tip, or branch (see *Glossary*). Rotten segments were identified. With these data the cubic volume in each sound segment of every tally tree was computed. Then for timberland, we calculated total net cubic volume by island:

Island:	Net timberland volume *1,000 ft^3 (1,000 m^3)*
Tutuila (including Aunu'u)	6,209 (175.8)
Ta'u	1,918 (54.3)
Ofu (including Nu'utele)	180 (5.1)
Olosega	- (-)
Total volume	8,307 (235.2)

We also computed total net timberland volume, by tree species *(table 6)*, and by tree component:

Tree component:	Net timberland volume	
	1,000 ft³ (1,000 m³)	
Sawtimber:		
Sawlog	3,796	(107.5)
Upper stem	735	(20.8)
Craftwood bolts	212	(6.0)
Branch and crotch	491	(13.9)
Tip	56	(1.6)
Roughwood	343	(9.7)
Total	5,633	(159.5)
Poletimber:		
Poletimber	2,278	(64.5)
Tip	251	(7.1)
Branch	145	(4.1)
Total	2,674	(75.7)
Total volume	8,307	(235.2)

Each sample point was marked and referenced and each tally tree was tagged and numbered to facilitate relocation and remeasurement. When the plots are revisited, measurements of diameter at breast height, growth, and tree mortality will be possible.

Reliability of Inventory Data

Timberland area estimates for Ofu (including Nu'utele); Olosega, Ta'u, and Tutuila (including Aunu'u) were developed by treating mapped timberland area for each island as a separate, independent population. On each island, the area estimate for timberland was calculated by multiplying the mapped timberland area by the proportion of regular and supplemental plots that proved to be timberland. These estimates were subject to sampling error unless all or none of the plots classified as timberland on the type maps were correctly classified. Sampling errors were calculated by using the formula for random sampling (Cochran 1963).

The timberland area estimate for American Samoa is the sum of estimates for the four islands, and the overall sampling error is derived from the sum of the four variances.

Volume estimates are also subject to sampling error since they are derived from sample measurements. Volume per unit of area is a mean value based on all field-measured timberland plots (n=20).

Estimates of timberland area and volume and the associated confidence intervals at the 67 percent probability level for American Samoa are:

Timberland area:
16,625 acres ± 1850 acres (6,728 ha ± 749 ha)
Net timberland volume:
8,307,000 ft³ ± 1,931,700 ft³)
(235,200 m³ ± 54,700 m³)

Confidence intervals are quantitative expressions of the reliability of the timberland area and volume statistics. Thus, a two-in-three chance exists that there are between 14,775 and 18,475 acres (5979 and 7477 ha) of timberland and between 6,375,300 and 10,238,700 ft³ (180,500 and 289,900 m³) of timberland volume within American Samoa.

In an earlier appraisal, Nelson (1964) estimated that the forest land on which timber crops could be managed in Tutuila totaled 10,000 acres (4000 ha), with another 8,000 acres (3200 ha) on which watershed values should be protected because of steep topography.

Table 6—*Net timberland volume, by species, American Samoa, 1985*

Species (common name)	Net volume	
	1000 ft³ (1000 m³)	
Aglaia samoensis (laga'ali)	131	(3.7)
Alphitonia zizyphoides (toi)	49	(1.4)
Alstonia spp.	60	(1.7)
Arytera spp. (lau'lili'i)	42	(1.2)
Barringtonia samoensis (falaga)	46	(1.3)
Bischofia javanica ('o'a)	152	(4.3)
Calophyllum samoense (tamanu)	869	(24.6)
Cananga odorata (moso'oi)	39	(1.1)
Cerbera manghas (leva)	131	(3.7)
Cocos nucifera (niu)	201	(5.7)
Colubrina asiatica (fisoa)	57	(1.6)
Cordia subcordata (tauanave)	71	(2.0)
Diospyros samoensis ('au'auli)	357	(10.1)
Dysoxylum huntii (maota mea)	138	(3.9)
Dysoxylum maota (maota)	290	(8.2)
Erythrina variegata (gatae)	42	(1.2)
Eugenia spp.	53	(1.5)
Ficus spp. (mati)	42	(1.2)
Flacourtia rukam (filimoto)	258	(7.3)
Gironniera celtidifolia (lau'nini'i)	81	(2.3)
Hibiscus tiliaceus (fau)	258	(8.0)
Inocarpus fagifer (ifi)	332	(9.4)
Kleinhovia hospita (fu'afu'a)	60	(1.7)
Litsea samoensis (papaono)	74	(2.1)
Mangifera indica (mago)	170	(4.8)
Myristica spp. ('atone)	1,373	38.9)
Neonauclea forsteri (afa)	64	(1.8)
Planchonella torricellensis (mamalava)	360	(10.2)
Psychotria spp. (matalafi)	92	(2.6)
Rhus taitensis (tavai)	1,338	(37.9)
Syzygium inophylloides (asi)	201	(5.7)
Terminalia richii (malili)	402	(11.4)
Others	474	(13.4)
Total	8,307	(235.2)
Cyathea spp. (olioli)	208	(5.9)
Total	8,515	(241.1)

Sources: Christophersen (1935), Amerson and others (1982), and Whistler (1984).

GLOSSARY

Agroforest: Land where planted fruit trees and other agricultural plants are cultured among forest trees.

Bolt: A 6-ft (2-m) section of a tree that is at least 11 inches (27.5 cm) in d.b.h. Must have a mid-point diameter of at least 10 inches (25 cm) and must not meet sawlog specifications.

Branch: Tree limb not meeting sawlog or bolt specifications.

Crotch: The swollen portion of a tree stem at a fork.

Cull: A volume deduction for rotten wood.

Cull trees, rotten: Trees that are more than 75 percent defective because of rot.

D.b.h.: Diameter at breast height. Tree diameter outside bark measured at breast height, 54 inches (1.3 m) above the ground.

Forest land: Land at least 10 percent stocked by live trees or land formerly having such tree cover and not currently developed for nonforest use.

Land area: Land area includes dry land and land temporarily or partially covered by water, such as marshes, swamps, and river flood plains.

Land class: A classification of land by major use or major vegetative characteristics, i.e., forest, secondary vegetation, agroforest, and nonforest.

Net volume: The cubic volume, exclusive of rotten wood.

Nonforest land: Land that has never supported forests or was formerly forested and is currently developed for nonforest use.

Other forest land: Forest land incapable of producing trees of merchantable size (5 inches [12.5 cm] d.b.h.) because of adverse site conditions or land that is physically unsuited for the production of industrial crops of wood because of rocky or steep terrain.

Poletimber tree: A live tree that is between 5 inches (12.5 cm) and 11 inches (27.5 cm) in d.b.h.

Poletimber volume: The net cubic volume in poletimber trees.

Rough wood: Logs of sawtimber size that fail to meet saw-log specifications because of poor form or excessive limbs.

Saw-log: A straight segment of a sawtimber tree that is at least 8.2 ft (2.5 m) long and no less than 9 inches (22.5 cm) in diameter outside the bark at the small end.

Sawtimber tree: A live tree that is at least 11 inches (27.5 cm) in d.b.h.

Sawtimber volume: The net cubic volume in sawtimber trees.

Secondary vegetation: A vegetation type characterized by small, fast-growing trees and vines, usually weedy invaders.

Stump: The portion of a tree that lies below a point 12 inches (0.3 m) above the ground.

Timberland: Forest land capable of producing 20 ft^3 per acre (1.4 m^3 per ha) per year or more of industrial wood (commercial roundwood other than firewood) and not withdrawn from timber utilization.

Timber volume: Includes the net cubic volume of all poletimber and sawtimber trees, including tip and branches but excluding stump.

Tip: The portion of the main stem of a sawtimber or poletimber tree that is less than 4 inches (10 cm) in diameter outside the bark.

Tree component: A segment of a tree with specific utilization characteristics (bolt, branch, crotch, rough wood, saw log, tip, upper stem).

Upper-stem: The bole of a sawtimber tree above the saw-log top—9 inches (22.5 cm) outside the bark—to a minimum top diameter of 4 inches (10 cm) outside the bark or to the point where the central stem breaks into limbs.

Vegetation type: An area delineated on the vegetation maps as having species composition similar to one of the types described in the section on type classification.

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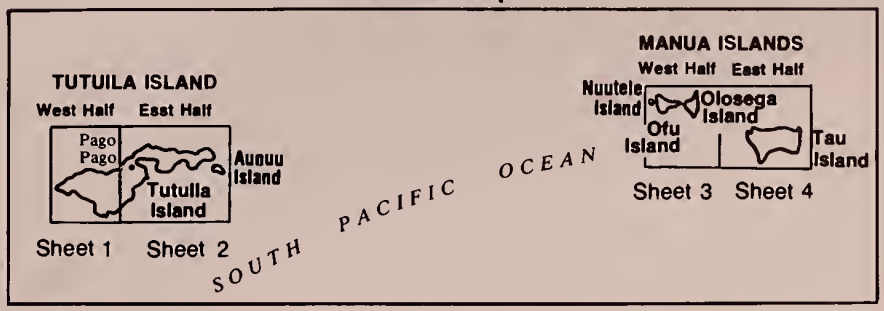
TUTUILA ISLAND
West Half
Sheet 1 of 4

Cole, Thomas G.; Whitesell, Craig D.; Whistler, W. Arthur; McKay, Neil; Ambacher, Alan H. Vegetation survey and forest inventory, **American Samoa**. Resour. Bull. PSW-25. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1988. 16 p. + 4 maps.

AMERICAN SAMOA
Index Map



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TOPOGRAPHIC MAP
WEST HALF

TUTUILA ISLAND
AMERICAN SAMOA

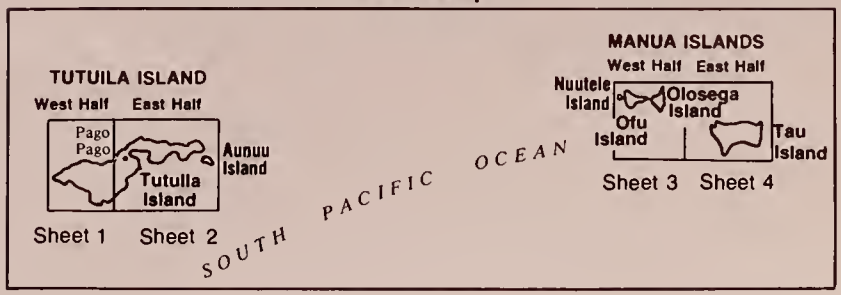
VEGETATION LEGEND

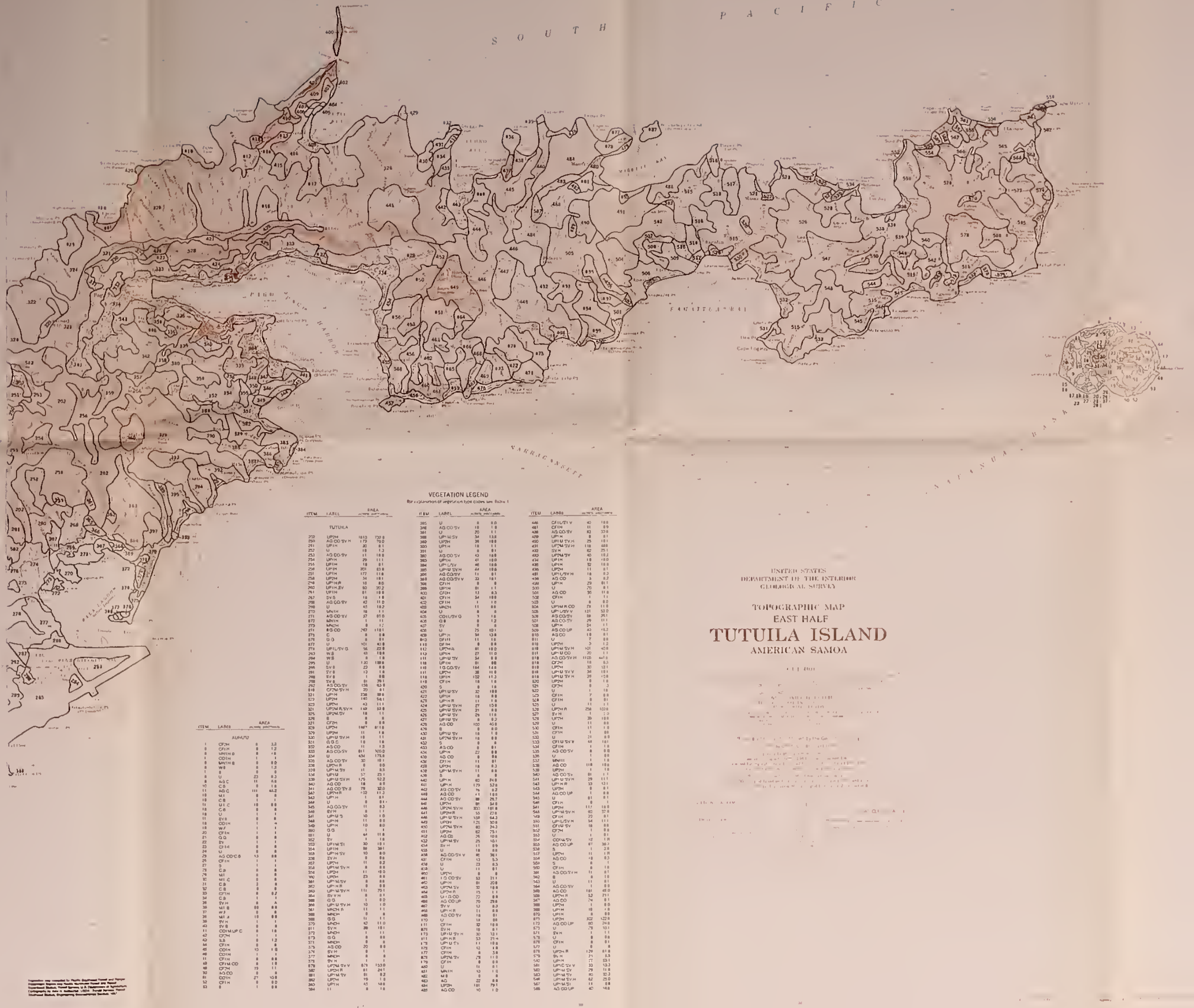
SOUTH PACIFIC OCEAN

TUTUILA ISLAND
East Half
Sheet 2 of 4

Cole, Thomas G.; Whitesell, Craig D.; Whistler, W. Arthur; McKay, Neil; Ambacher, Alan H. Vegetation survey and forest inventory, American Samoa. Resour. Bull. PSW-25. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1988. 16 p. + 4 maps.

AMERICAN SAMOA
Index Map





VEGETATION LEGEND

For explanation of vegetation type codes see Table 1

ITEM	LABEL	AREA	
	TUTUILA		
202	UP?H	1813	720.8
250	AG CO SV H	179	70.2
251	UP1N	30	8.1
252	U	18	1.3
253	AG CO SV	11	18.8
254	UP1N	29	11.1
255	UP1N	18	8.1
256	UP1N	201	63.8
257	UP1N	177	118
258	UP2N	34	18.1
274	UP1N R	13	8.6
275	UP1N SV	50	20.2
281	UP1N	81	18.8
287	SV R	18	1.6
288	AG CO SV	42	11.0
298	U	45	18.2
370	MN1H	18	1.1
371	AG CO SV	27	61.6
372	MN1H	1	1.1
373	MN2H	8	1.2
374	AG CO	740	1181
375	C	8	0.8
376	C G	8	0.1
377	U	101	42.8
378	UP1L SV G	56	22.8
293	W S	43	18.8
294	W S	8	1.6
295	U	130	1388
296	SV R	22	8.8
297	SV R	12	1.8
298	SV R	1	0.8
299	SV R	81	39.1
282	AG CO SV	136	63.8
318	C?2N SV H	29	8.1
321	UP1N	238	88.6
322	UP2H	140	54.1
323	UP1N	43	11.1
324	UP2N R SV H	149	33.8
325	UP2N SV	18	1.1
326	B	8	0.8
327	C?2N	8	0.8
328	UP2N	1887	811.6
329	UP2H	11	1.8
330	UP1N SV H	18	1.1
331	G G C	18	1.8
332	AG CO	11	1.5
333	AG CO SV	811	302.0
334	U	434	175.8
335	AG CO SV	30	18.1
336	UP2N R	8	0.8
339	UP1N SV	11	8.5
340	UP1N	57	23.1
339	UP1N SV H	179	52.2
340	AG CO	18	8.8
341	AG CO SV R	78	32.8
345	UP2N R	120	11.3
342	UP1N	1	0.1
343	U	8	0.1
345	AG CO SV	11	8.3
346	SV H	8	1.1
347	UP1N R	11	8.8
348	UP1N	10	8.0
360	G G	1	1
361	U	64	11.8
362	SV	1	1.8
363	UP1N SV	30	18.1
364	UP1N	88	36.1
369	UP1N SV	10	8.0
368	SV H	8	0.8
367	UP2N	11	8.2
366	UP1N SV H	8	0.8
365	UP2H	11	48.0
366	UP2H	23	8.8
381	UP1N SV	8	0.8
382	UP1N R	8	0.8
383	UP1N SV H	111	79.1
384	SV H	8	0.1
388	G G	1	0.0
386	UP1N SV H	10	1.0
387	UP2N R	11	1.1
388	MN2H	8	0.8
389	C G	11	1.1
390	MN2H	52	11.0
391	SV H	38	18.1
392	MN2H	1	1.1
393	G G	8	0.8
394	MN2H	8	0.8
395	U	1	0.1
396	AG CO	20	0.8
397	SV H	8	1
398	MN2H	8	0.8
399	SV H	1	1
400	UP2N SV H	878	1530
401	UP2H R	81	241
402	UP1N SV	81	8.2
403	UP2H	16	1.8
404	UP1N	45	148
405	U	8	1.8

ITEM	LABEL	AREA	
	AUNU'U		
1	C?2H	8	3.2
8	C?1H	8	1.2
8	MN1H B	8	1.8
8	C?1N	8	1
8	MN1H B	8	0.8
8	W B	8	1.3
8	B	8	0
8	U	23	8.3
8	AG C	11	4.8
10	C B	8	1.8
11	AG C	111	44.8
11	U	8	8
18	C B	1	1
18	C B C	10	8.8
18	C B	8	8
18	U	1	1
18	SV R	8	8
18	CO1N	1	1
18	W 2	1	1
20	C?1N	8	8
21	G G	8	8
22	SV	1	1
23	C?1H	8	8
24	U	8	8
29	AG CO C B	53	8.8
29	C?1N	1	1
29	B	8	8
29	C B	8	8
29	W C	8	8
31	W C	8	8
33	C B	3	8
33	C B	8	8
33	C?1N	8	8.2
34	C B	8	1
36	SV H	8	A
36	W C B	88	8.8
37	W 2	8	8
38	W C 2	18	8.8
39	SV H	1	1
41	G G	8	8
41	CO1H UP C	8	1.8
42	C?2N	1	1
42	B	8	1.2
44	C?1N	8	8
44	C?2N	10	1.8
45	CO2N	1	1
45	C?1N	8	8.8
48	C?1H CO	8	1.8
49	C?2H	79	11
52	AG CO	8	8
81	CO1N	21	4.8
82	C?1N	8	8.8
83	B	1	8.8

ITEM	LABEL	AREA	
385	U	8	8.8
386	AG CO SV	18	1.8
387	U	20	1.1
388	UP1 U SV	34	13.8
389	UP2N	38	18.8
390	UP1N	18	1.1
391	U	8	8.1
392	AG CO SV	43	18.8
393	UP1N	41	18.8
394	UP1 U SV	46	18.8
395	UP1 U SV H	44	18.8
396	AG CO SV	11	8.1
397	AG CO SV V	23	18.1
398	C?1N	8	8
399	UP1N	81	1.1
400	C?2H	13	8.3
401	C?1N	34	18.8
402	C?1N	1	1.8
403	UP2N	11	8.8
404	U	45	18.2
405	C?1H U SV G	3	1.8
406	G B	8	1.2
407	SV	8	8
408	U	75	18.1
409	UP1N	34	13.8
410	C?1H	11	1.8
411	C?1N	8	8.8
412	UP2N R	81	18.8
413	UP1N	27	11.8
414	UP1 U SV	34	8.8
415	UP1N	81	8.8
416	T G CO SV	164	1.4.8
417	UP1N	38	11.8
418	UP1N	102	11.3
419	C?1N	18	1.8
420	S	8	1.8
421	UP1 U SV	32	18.8
422	UP1N	18	8.8
423	UP1N R	11	1.8
424	UP1 U SV N	27	1.8.8
425	UP1 U SV N	21	8.8
426	UP1 U SV	29	11.8
427	UP1 U SV	8	8.2
428	AG CO	100	41.8
429	B	8	8.8
430	UP1 U SV	18	1.8
431	UP2N SV H	8	8.8
432	AG CO	8	8.1
433	AG CO	8	8.1
434	UP1N	22	8.8
435	AG CO	8	8.8
436	C?1N	11	8.1
437	UP1N	18	8.3
438	UP1 M SV H	11	8.8
439	B	8	8
440	UP1N	62	24.8
441	UP1N	129	52.8
442	AG CO SV	76	8.2
443	AG CO	41	18.8
444	AG CO SV	88	29.7
445	UP2N	89	34.8
446	UP2N SV H	350	181.8
447	UP2N R	55	22.8
448	UP1 U SV H	138	64.3
449	UP2N	126	50.8
450	UP2N SV H	60	24.3
451	UP2H	82	25.1
452	AG CO	76	18.8
453	UP1 M SV	25	10.1
454	SV H	11	8.9
455	U	18	8.8
456	AG CO SV V	85	38.1
457	C?1N	13	5.3
458	U	23	8.3
459	U	11	8.1
460	T G CO SV	53	21.1
461	UP1N	81	20.8
462	UP1N SV	30	18.8
463	UP2N R	13	1.1
464	U G CO	72	8.8
465	AG CO UP	70	28.8
466	SV V	13	8.3
467	UP1 R	11	8.8
468	AG CO SV	18	8.1
469	U	18	8.8
470	C?1N	32	18.8
471	SV H	18	8.1
472	UP1 U SV H	30	13.1
473	UP1 N R	53	21.4
474	UP1 U SV	11	18.8
475	C?1N	13	1.8
476	C?1N	8	3.8
477	UP2N SV	79	11.8
478	C?1N	8	8.8
479	U	11	8.1
480	UP1N	13	1.8
481	W B	8	8
482	AG	32	8.8
483	UP2H	181	73.1
484	AG CO	10	1.8

ITEM	LABEL	AREA	
485	C?1 U SV	13	1.8.8
486	C?1 N	11	8.9
487	AG CO SV	13	3.8
488	UP2N SV H	118	48.8
489	SV H	13	2.1
490	UP2N SV	13	19.2
491	UP1N	18	1.8.8
492	SV H	12	1.8.8
493	UP2N SV	13	8.1
494	UP1N	18	8.2
495	UP1N	11	8.1
496	UP2H	11	8.1
497	UP1 U SV H	18	8.2
498	AG CO	3	8.2
499	UP1N	29	8.1.1
500	U	70	8.1
501	AG CO	36	1.1.8
502	C?1N	1	1.1
503	U	8	8.8
504	UP1 M CO	78	1.1.8
505	UP1 U SV	131	53.8
506	AG CO SV	88	36.1
507	AG CO SV	26	1.1.1
508	UP1N	34	1.1.1
509	AG CO UP	43	1.8.2
510	AG CO	18	8.1
511	U	7	2.8
512	UP2N	3	1.2
513	UP1 M SV H	101	40.8
514	UP1 U CO	20	1.1
515	AG CO SV H	1103	441.8
516	C?2N	18	8.3
517	UP2N	30	12.1
518	UP1 U SV H	34	13.1
519	UP1 U SV N	28	1.1.8
520	UP2N	8	1.8
521	C?2N	8	3
522	U	1	1.8
523	C?1N	8	8.1
524	C?1N	8	8.1
525	U	11	1.1
526	UP2N R	258	103.8
527	SV H	1	1.0
528	UP2N	20	1.8.8
529	U	11	8.8
530	C?1N	11	1.8
531	C?1N	1	8.8
532	U	21	8.8
533	C?1 U SV H	44	18.1
534	C?1N	1	1.8
535	AG CO SV	8	8.8
536	U	1	8.8
537	MN1H	1	1.8
538	AG CO	118	1.8.8
539	UP2H	1	1.8
540	AG CO SV	81	1.1
541	UP1 U SV H	29	1.1.1
542	UP1 N R	13	5.1
543	UP2H	8	8.1
544	AG CO UP	1	8.8
545	U	81	8.1
546	C?1N	8	1
547	UP2N	111	1.8.8
548	UP1 M SV H	80	32.8
549	C?1N	23	8.1
550	UP1 U SV H	54	1.1.1
551	C?1 U SV	18	8.8
552	C?2H	1	8.8
553	U	1	8.1
554	C G H SV	12	1.8
555	AG CO UP	87	38.2
556	S	1	2.8
557	UP2H	11	1.8
558	AG CO	8	8.3
559	S	8	1
560	C?1N	8	1.8
561	AG CO SV H	11	8.1
562	B	8	1.8
563	U	11	8.1
564	AG CO SV	1	8.8
565	AG CO	181	48.8
566	UP2N R	52	21.1
567	AG CO	24	8.1
568	UP2H	1	8.8
569	UP1N	18	1.8
570	UP1N	8	8.8
571	UP2H	252	102.8
572	AG CO UP	85	24.8
573	U	29	13.1
574	SV N	1	1.1
575	U	8	8.8
576	C?1N	8	8.1
577	U	8	8
578	UP2N R	129	51.8
579	SV N	21	8.5
580	UP1N	77	13.1
581	UP1 C SV	32	13.3
582	UP1 U SV	29	11.8
583	UP1 M SV	80	32.3
584	UP1 M SV H	82	25.8
585	UP1 M SV	11	8.8
586	AG CO UP	6	1.8.8

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TOPOGRAPHIC MAP
EAST HALF

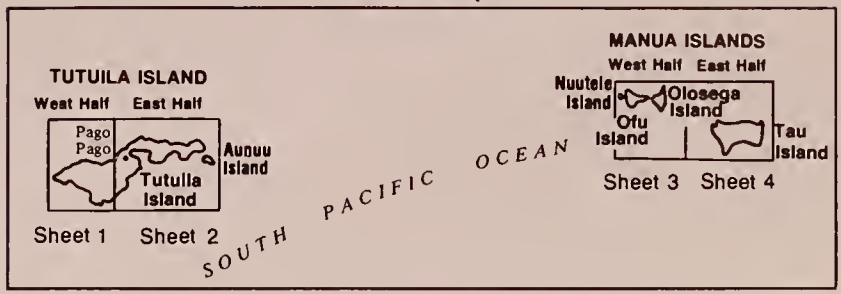
TUTUILA ISLAND

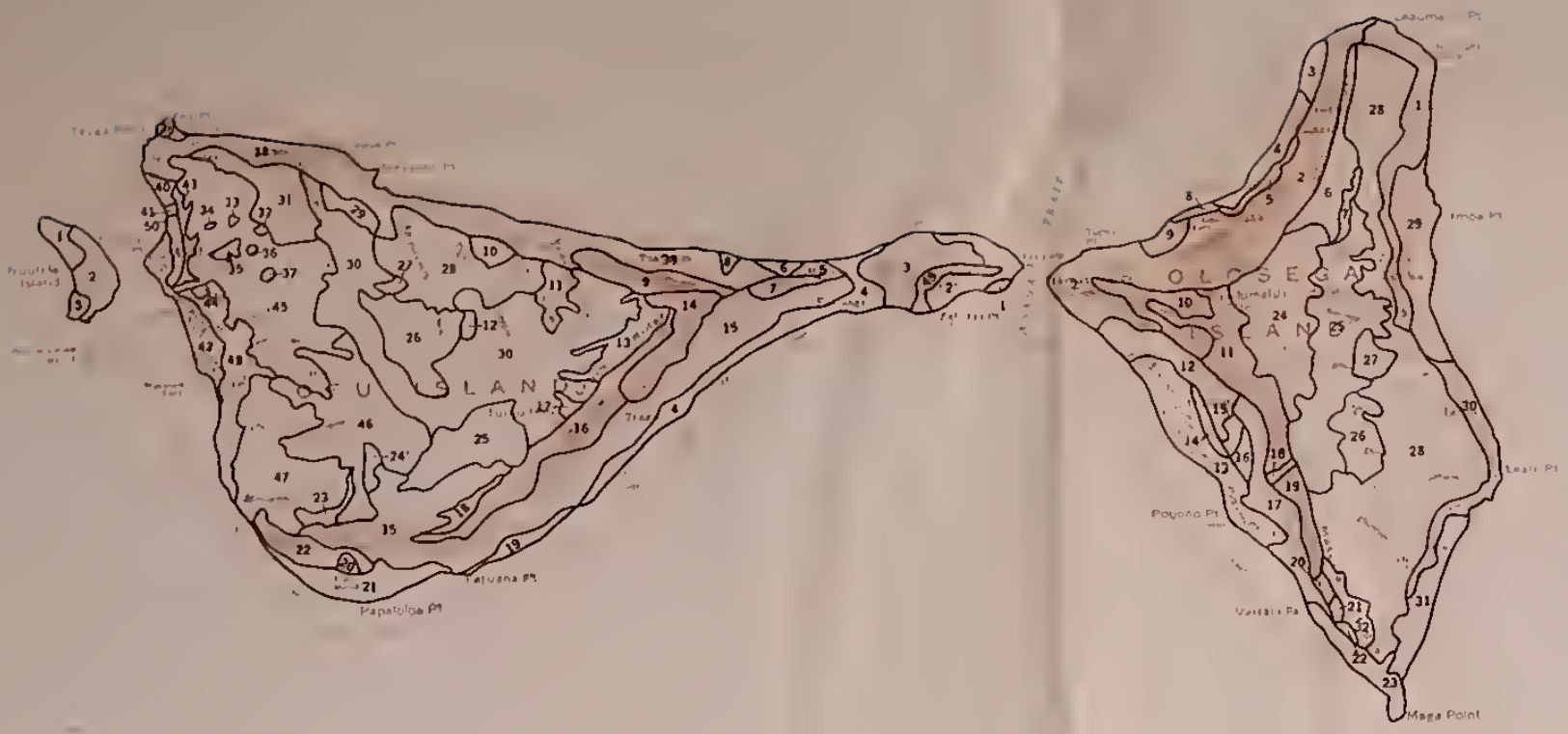
AMERICAN SAMOA

MANUA ISLANDS
West Half
Sheet 3 of 4

Cole, Thomas G.; Whitesell, Craig D.; Whistler, W. Arthur; McKay, Neil; Ambacher, Alan H. Vegetation survey and forest inventory, American Samoa. Resour. Bull. PSW-25. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1988. 16 p. + 4 maps.

AMERICAN SAMOA
Index Map





VEGETATION LEGEND

For explanation of vegetation type codes see Table 3

ITEM	LABEL	AREA acres	AREA hectares
	NUUTELE		
1	CF1H	11	4.6
2	CO1M CF	23	9.3
3	CF1H	4	1.6
	OFU		
1	S	2	.8
2	OV1H	26	10.5
3	UP1H	40	16.2
4	CO1H	54	21.9
5	CF1M/SV	5	2.0
6	S	1	.4
7	OV1H	8	3.2
8	L	3	1.2
9	OV1H	25	10.1
10	UP1H	9	3.6
11	UP1M/SV	15	6.1
12	G.G.S	3	1.2
13	UP1M/SV	25	10.1
14	UP1H	37	15.0
15	UP1H	223	90.2
16	OV1H	59	23.9
17	UP1M/SV	3	1.2
18	G.G.S	9	3.6
19	CF1H	11	4.5
20	M F C	3	1.2
21	CO1H	35	14.2
22	CF1M/SV	21	8.5
23	G.G	7	2.8
24	G.G	8	3.1
25	UP1H C	50	20.2
26	UP1M/SV S	52	21.0
27	G.G.S	3	1.2
28	CO1M UP	83	33.6
29	CO1H	10	4.0
30	UP1H R	249	100.8
31	CO1M UP	45	18.2
32	CO1M/SV	1	.4
33	G.G	1	.4
34	G.G	1	.4
35	G.G	3	1.2
36	G.G	1	.4
37	G.G	1	.4
38	CF1H	154	62.5
39	S	3	1.2
40	AG C	5	2.0
41	U	1	.4
42	U	29	11.7
43	G.G	9	3.6
44	C	1	.4
45	CO1H	164	66.4
46	UP2H R	106	42.9
47	CO1H	95	38.4
48	AG/SV	47	19.0
48	OV1H	11	4.5
50	AG CO	7	2.8

ITEM	LABEL	AREA acres	AREA hectares
	OLOSEGA		
1	CF1H	55	22.3
2	CF2H	176	71.2
3	CF1H	9	3.6
4	AG CO/U	18	7.3
5	CO1M/SV	8	3.2
6	OV1H	36	14.6
7	G.G	6	2.4
8	U	3	1.2
9	CO1H	9	3.6
10	OV1H	31	12.5
11	UP1H	58	23.5
12	CF1M	38	15.4
13	AG CO/U	59	23.8
14	M F C	6	2.4
15	CO1H	6	2.0
16	CF1M	6	2.4
17	CF1H	42	17.0
18	OV1H	3	1.2
19	UP1H	18	7.3
20	OV1H	4	1.6
21	UP1H	3	1.2
22	OV1H	2	.8
23	G	23	9.3
24	MS1H C	93	37.6
25	UP1H R	109	44.1
26	CO1M UP R	28	11.3
27	CO1M UP R	12	4.9
28	CO1H	305	123.8
29	CF2H	55	22.5
30	CF1H	38	15.4
31	CO1M CF	31	12.5
32	CO1M/SV	14	5.7

Topographic map compiled by Pacific Southwest Forest and Range Experiment Station and Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture
Cartography by Alan H. Anderson, USDA - Forest Service, Pacific Southwest Region, Engineering Cartographic Section, 1961

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TOPOGRAPHIC MAP
WEST HALF
MANUA ISLANDS
AMERICAN SAMOA

SCALE 1 (illegible)

CONTOUR INTERVAL (illegible)
DATUM (illegible)

(illegible)

Mapped (illegible) and published (illegible) the Geological Survey
(illegible) USGS (illegible) USGS

To obtain (illegible)

(illegible)

1000-foot (illegible) based on (illegible)

LOCATION DIAGRAM

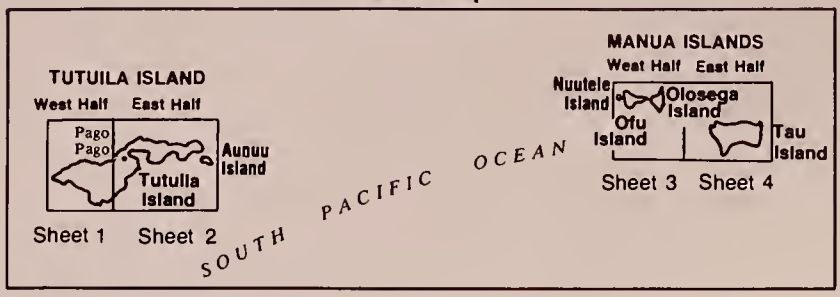
ROAD CLASSIFICATION

INDEX TO (illegible)

MANUA ISLANDS
East Half
Sheet 4 of 4

Cole, Thomas G.; Whitesell, Craig D.; Whistler, W. Arthur; McKay, Neil; Ambacher, Alan H. Vegetation survey and forest inventory, American Samoa. Resour. Bull. PSW-25. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1988. 16 p. + 4 maps.

AMERICAN SAMOA
Index Map



S O U T H

P A C I F I C

O C E A N

VEGETATION LEGEND

For explanation of vegetation type codes see Table 3

ITEM	LABEL	AREA (ACRES)	AREA (HECTARES)
	TA'U		
1	S	9	3.6
2	AG CO	21	8.5
3	CO1M/SV,G	48	19.4
4	S	5	2.0
5	U/AG	18	7.3
6	AG	15	6.1
7	CF1H	44	17.8
8	CO1M/SV,G	37	15.0
9	CF1H	8	3.2
10	U	43	17.4
11	M F C	17	6.9
12	U	6	2.4
13	AG	42	17.0
14	G G S	27	10.9
15	UP1H	6	2.4
16	G G	1	.4
17	G G	3	1.2
18	SV	2	.8
19	SV	2	.8
20	CF1H	48	19.4
21	G G	2	.8
22	UP1H R	11	4.5
23	AG,CO,UP,R	214	86.6
24	UP1H	60	24.3
25	UP1H R	6	2.4
26	UP1H R	14	5.7
27	CO1M UP	161	65.2
28	S	2	.8
29	CO1H UP	325	131.5
30	UP1M/SV	18	8.5
31	CO1H UP	28	11.2
32	UP1M CO	13	5.3
33	UP1H	91	36.8
34	UP2H C	12	4.8
35	G G	7	2.8
36	CO1H	5	2.0
37	UP2H	32	12.9
38	UP1M/SV	15	6.1
39	UP1H	15	6.1
40	UP2H	42	17.0
41	UP2H R	38	14.6
42	S	41	16.6
43	UP2H	127	51.4
44	MS1H C	9	3.6
45	CF1H	97	39.3
46	CO1H	62	25.1
47	G G	5	2.0
48	G G	5	2.0
49	SV S	5	2.0
50	UP2H R	53	21.4

ITEM	LABEL	AREA (ACRES)	AREA (HECTARES)
51	UP2H	119	48.2
52	MS1H C	2939	1189.4
53	DV1H	443	179.3
54	CF1M/SV	96	38.8
55	CO1H UP	426	172.4
56	UP1H	712	288.1
57	S	7	2.8
58	CO1H	50	20.2
59	S	14	5.7
60	S	8	3.2
61	U/AG	48	19.4
62	CO1H UP	8	3.2
63	SV S	10	4.0
64	CO1M/SV G	41	16.6
65	UP1H	27	10.9
66	CO1M/SV G	21	8.5
67	CO1H	117	47.3
68	S	17	6.9
69	AG CO	63	25.5
70	G G S	9	3.6
71	G G S	26	10.5
72	CO1M/SV	37	15.0
73	CO1M UP	503	203.6
74	UP1H	78	31.6
75	UP2H R	953	385.7
76	UP1H	684	276.8
77	UP1H C	13	5.3
78	UP2H	264	106.8
79	UP1H C	205	83.0
80	CF1H	38	15.4
81	CF2H	343	138.8
82	CF1H	9	3.8
83	CF1H	183	74.1
84	UP2H	113	45.7
85	CO1M/SV G,S	33	13.4
86	SV S	6	2.4
87	UP1H	46	18.6
88	CO1H	13	5.3
89	CF1H	101	40.9
90	UP2H R	232	93.9
91	UP1H	96	38.8
92	AG CO	126	51.0
93	CO1M/SV	18	7.3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TOPOGRAPHIC MAP
EAST HALF

MANUA ISLANDS

AMERICAN SAMOA

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4 FEET

Vegetation map compiled by Pacific Southwest Forest and Range Experiment Station and Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture. Cartography by Alan H. Ambacher, USDA - Forest Service, Pacific Southwest Region, Engineering Geomatronics Section, 1987

Cole, Thomas G.; Whitesell, Craig D.; Whistler, W. Arthur; McKay, Neil; Ambacher, Alan H. 1988. **Vegetation survey and forest inventory, American Samoa.** Resour. Bull. PSW-25. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 14 p. + 4 maps.

The vegetation of American Samoa, in the South Pacific Ocean, was mapped and the forest resources surveyed for land-use planning and forest resource management. Four maps show the location and extent of vegetation types identified from 1984 aerial photographs. A 1986 ground survey identified changes in land use since 1984. Adjusted forest area is estimated at 28,686 acres (11,609 ha), with an additional 15,510 acres (6277 ha) in agroforest. Timberland volume is estimated to be 8,307,000 ft^3 (235,200 m^3).

Retrieval Terms: vegetation survey, vegetation maps, forest types, forest inventory, Tutuila, American Samoa, Polynesia